



ABSTRACT

Summary

The present invention relates to a file management method of digital data stream recorded on a rewritable disk. The present file management method checks file names and directories of files written in the rewritable disk, and outputs a message indicating that reproduction is impossible when the file names and directories do not conform to the standard file scheme pre-specified for a disk containing real-time data file. That is, this method checks whether a current file scheme is normal and outputs a message indicative of impossible reproduction or failure of later reproduction based on the checked result. Therefore, a user is notified of the reason why disk reproduction fails in the event that a playback-requested file is not reproduced, furthermore, reproduction failure which would be caused from inadequate file name or directory can be prevented beforehand.

Key Figure

Figure 6

Key Words

filename change, directory change, PC, guide message of impossible reproduction, guide message of writing failure

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SPECIFICATION

Title

FILE MANAGING METHOD FOR A RECORDED DIGITAL DATA STREAM

Brief Description Of The Drawings

FIG. 1 shows partial elements of an optical disk device such as a video disk recorder;

FIG. 2 is an example of a fixed file system for a rewritable disk;

FIG. 3 shows a format of file identifier descriptor and

its recording fields;

FIGS. 4A to 4D are examples of file scheme made from file movement, file or directory renaming;

FIG. 5 is a flow diagram of a file management method for a recorded digital stream according to the present invention; and

FIG. 6 is a flow diagram of another file management method for a digital stream to be recorded according to the present invention.

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Major Elements In Drawings

1 : optical disk

2 : optical pickup

3 : VDR unit

4 : encoder

15 **Background Of The Invention**

The present invention relates to a file management method of informing that file name or directory change would make it impossible to reproduce or cause reproduction fail of real-time data files which are recorded in a disk recording medium such as a rewritable digital versatile disk (DVD-RAM, DVD-RW etc.).

FIG. 1 shows partial elements of an optical device such as a video disk recorder which recording and reproducing a signal to/from a disk recording medium such as a rewritable DVD. The device configured as FIG. 1 comprises an optical pickup 2 reading a signal recorded in a rewritable DVD 1 or writing a data stream processed into a writable signal in the rewritable DVD 1; a VDR unit 3 processing the read signal to restore to original data and converting an inputted data stream into a signal adequate to be written; and an encoder 4 encoding a received analog signal into a data stream which is sent to the VDR (Video Disk Recording) unit 3.

Disk file management method conducted by the optical device connected with a personal computer (PC) through a

digital interface is explained referring to the accompanying drawings.

Various types of data files are recorded in the rewritable DVD 1 and the data files consist of data stream files and information files. The data stream files contain text data or real time audio and video (A/V) data of large size and the information files contain control information such as navigation data for the A/V or text data contained in the data stream files.

To manage recorded files, a rewritable DVD may adopt fixed file structure, which is adopted for a DVD ROM disk, composed of a root directory, several title set directories located under the root, and data files having different names and extension located under each title set directory.

FIG. 2 shows an example of such a fixed file structure in which a video title set directory under a root directory has several data files having different extension names.

Under the video title set directory, many files of 'Video_TS.IFO', 'Video_TS.VOB', 'Video_TS.BUP', 'VTS_01_0.IFO', 'VTS_01_1.VOB', 'VTS_01_2.VOB', and 'VTS_01_0.BUP' have been recorded. The file 'Video_TS.IFO' contains video data management information, the file 'Video_TS.VOB' contains menu data of a recorded video object (VOB), the file 'Video_TS.BUP' contains backup data for the video data management information, the file 'VTS_01_0.IFO' contains information on the first video title set, the file 'VTS_01_1.VOB' is the first video object containing A/V data belonging to the first video title set, the file 'VTS_01_2.VOB' is the second video object containing A/V data belonging to the first video title set, and the file 'VTS_01_0.BUP' contains backup information on the first video title set.

Detailed information for the above files is written in a file identifier descriptor (FID) whose fields are shown in

FIG. 3A. These fields are 'Descriptor Tag', 'File Version Number', 'File Characteristics', 'Length of File Identifier', 'Information Control Block (ICB)', 'Length of Implementation Use', 'Implementation Use', 'Name of File Identifier', and padding. Among these fields, 'Name of File Identifier' field is used for writing a string indicative of a file name, 'Length of File Identifier' field is used for writing size information of the file name, and 'File Characteristics' field, whose size is 1 byte, is used for writing various attributes of the file. The attributes written in 'File Characteristics' field are shown in FIG. 3B. The first LSB (Least Significant Bit) indicates whether an associated file exists or not, the second LSB indicates whether the file is directory or file, the third indicates deletion of the file, the fourth indicates whether the directory is parent or not, the fifth indicates meta data, and the remaining bits are reserved for future use.

If the first title set recorded in the rewritable DVD 1 having the above file structure is requested to be reproduced after the rewritable DVD 1 is inserted in the optical disk device of FIG. 1, the VDR unit 3 searches the DVD 1 for video title set directory under the root directory, and tries to read the several files under the video title set directory. To read data files and their management file belonging to the first video title set requested to be reproduced, the VDR unit 3 refers to information written in FID. The VDR unit 3 reads data files sequentially after searching them using navigation information written in the management file.

A user who uses the optical device of FIG. 1 might request file name of a file recorded in the rewritable DVD 1 to be changed into a desirable name through the PC and the digital interface. In addition, a user might move one or more files under a video title set directory to other directory.

Such changes of file name and directory might be directly

conducted with a PC after a rewritable DVD is placed in the PC.

However, the VDR unit 3 searches a rewritable DVD for pre-specified file names under pre-specified directory, which satisfy the file structure shown in FIG. 2, according to a playback-requested video title set or A/V data stream, therefore, the VDR unit 3 could not determine which file to read if the file or directory names have been changed or files have been moved to other directories through a connected PC to the disk device, so that it could not reproduce a playback-requested video title set.

Subject To Solve Through The Invention

It is an object of the present invention to provide a file management method checking whether or not file names and their directory schemes are normal and informing that real-time data files can not be reproduced or would be failed based on the checked result.

Explanation Of The Invention

A file management method according to the present invention checks file names and directories of files written in a rewritable disk when real-time data contained in the files is requested to be reproduced, and outputs a message indicating that later reproduction would be impossible when the file names and directories do not conform to the standard file scheme pre-specified for a disk containing real-time data file.

Another file management method according to the present invention checks a file name and directory of a file requested to be recorded in a rewritable disk, and outputs a message indicating that later reproduction would fail if recorded as requested when the file name and/or the directory does not conform to the standard file scheme pre-specified for a disk containing real-time data file.

In order that the invention may be fully understood, preferred embodiments thereof will now be described with reference to the accompanying drawings.

FIGS. 4A and 4B show examples that file name or directory of a certain file has been changed from the file structure of a rewritable DVD depicted in FIG. 2. In the example of FIG. 4A, the name of 'Video_TS.IFO' under a video title set directory has been changed to 'abcd.IFO', which does not belong to file names pre-specified in the standard fixed file structure of a rewritable DVD, through a PC. In the example of FIG. 4B, a video title set directory has been renamed to an arbitrary directory name 'abcd'.

10 FIG. 4C shows another example that the file 'Video_TS.IFO' under a video title set directory has been moved to root directory, which is not proper directory under which the information file of a video title set should exist, through a PC. FIG. 4D shows another example that all files under the root directory has been moved under an arbitrary directory 'abcd'.

If a rewritable DVD having such a wrong file scheme as mentioned in FIGS. 4A to 4D is requested to be reproduced, the reproduction can not be conducted. The method informing a user about such a fail in reproduction is explained in detail hereinafter.

FIG. 5 is a flow chart embodying a file managing method for a recorded digital stream. The flow of FIG. 5 to inform of the reason why data reproduction of a rewritable DVD fails is described with reference to the disk device of FIG. 1.

A user inserts a rewritable DVD 1 containing real-time data stream files into the disk device (S10) and requests the DVD 1 to be reproduced (S11). Then, the VDR unit 3 checks the file scheme of the inserted DVD to know whether the present file structure is adequate to reproduce (S12).

If one among the written files has abnormal name (S13) which is contrary, as shown in FIG. 4A, to file name assigning rule which should be satisfied for a disk containing real-time

data, the VDR unit 3 constructs a message informing that a file name is inadequate so that it is impossible to reproduce, and outputs the constructed message to be displayed (S14).

Therefore, a user is notified of the reason of reproduction failure.

If one or more files are positioned under wrong or inadequate directory (S15) due to file movement or change of directory name as shown in FIGS. 4B to 4D, the VDR unit 3 also constructs a message informing that the directory structure is messed up, and outputs the message to be displayed (S16).

Therefore, a user is notified that the disk reproduction failed because of nonstandard directory structure or name.

If all files and directories are normal, that is, all files have pre-specified standard names satisfying the file name assigning rule and are positioned under pre-specified directories, the VDR unit 3 reproduces a playback-requested files of the inserted rewritable DVD 1 (S17).

Therefore, a user can know the reason of playback failure if requested playback is not conducted.

FIG. 6 is a flow chart embodying another file managing method for a digital stream to be recorded. The flow of FIG. 7 is to inform that recorded data will fail in reproduction since the name of record-requested file or directory to write the file under is against pre-specified standard rule.

A user inserts a rewritable DVD 1 into the disk device (S30) and requests a file containing real-time data stream to be recorded in the DVD 1 (S31). Then, the VDR unit 3 checks a file name and a directory assigned by a user to know whether the file name and the directory agree with pre-specified standard file structure (S32).

If the assigned file name or directory is against the standard rule of file name assignment and standard directory scheme specified for real-time data (S33, S34), the VDR unit 3

constructs a corresponding message informing that the assigned file name is inadequate or the directory to write the file under is wrong so that later reproduction would be impossible if recorded as requested, and outputs the constructed message to be displayed (S35). Therefore, a user is notified that the file name or directory is specified wrongly for a file containing real-time data.

After the message being outputted, if a user still wants to record the file as requested before (S36), the VDR unit 3 writes real-time data received from an external device in the inserted rewritable DVD 1 through the pickup 2 (S38). If a user cancels the requested record (S37), the VDR unit 3 deletes the record information such as file name and directory received before from its internal memory and stops record operation. Thus, recording fails which would be caused from wrong filename or directory can be prevented in advance.

Effect Of The Invention

The file managing method for real-time data file according to the present invention informs that file name or directory change would make it impossible to reproduce or cause reproduction fail of real-time data files which are recorded in a disk recording medium such as a rewritable digital versatile disk. Therefore, a user is notified of the reason why disk reproduction fails and corrects wrong file scheme, if wanted, drawn up in a rewritable disk when a file containing real-time data stream is requested to be recorded, thereby preventing reproduction failure which would be caused from inadequate file name or directory.

What is claimed is:

1. A file managing method in reproducing a rewritable disk, comprising the steps of:

(a) checking the file names and directories of files written in the rewritable disk; and

(b) providing a message indicating that reproduction is impossible when the file names and/or directories are against a standard file scheme pre-specified for a disk containing real-time data.

5 2. The method set forth in claim 1, wherein the reason why the reproduction is impossible is contained in said message.

3. The method set forth in claim 1, wherein said steps (a) and (b) are conducted when the reproduction is requested.

10 4. A file managing method in recording a data stream in a rewritable disk, comprising the steps of:

(a) checking a file name and/or directory of the file requested to be recorded in the rewritable disk; and

(b) providing a message indicating that reproduction
15 would fail later if recorded as requested when the file name and/or the directory is against a standard file scheme pre-specified for a disk containing real-time data file.

5. The method set forth in claim 4, further comprising the step of recording received data as requested if the request
20 of record is received again after the message being provided.

6. The method set forth in claim 4, wherein the reason why the later reproduction would fail is contained in said message.

FIG. 1

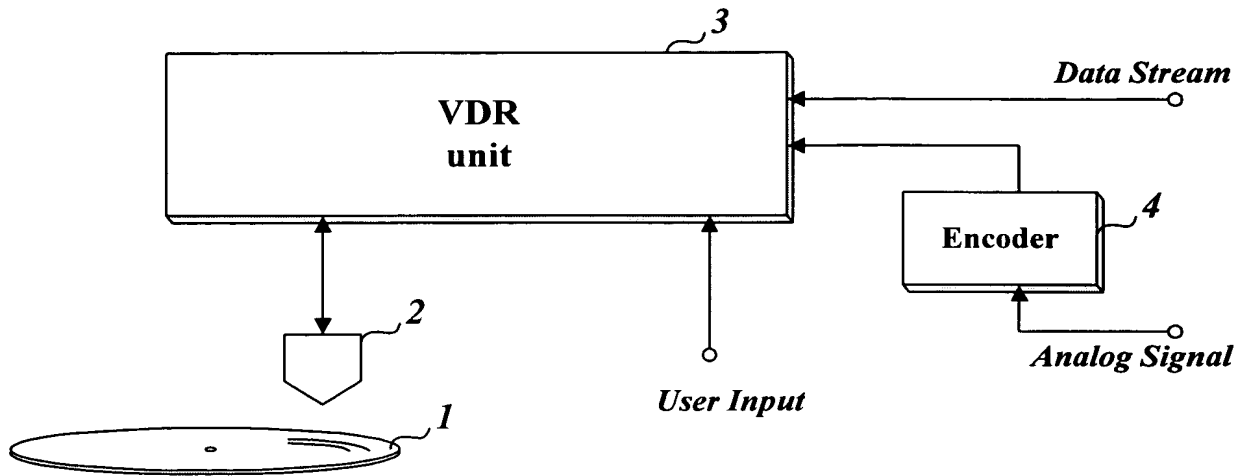


FIG. 2

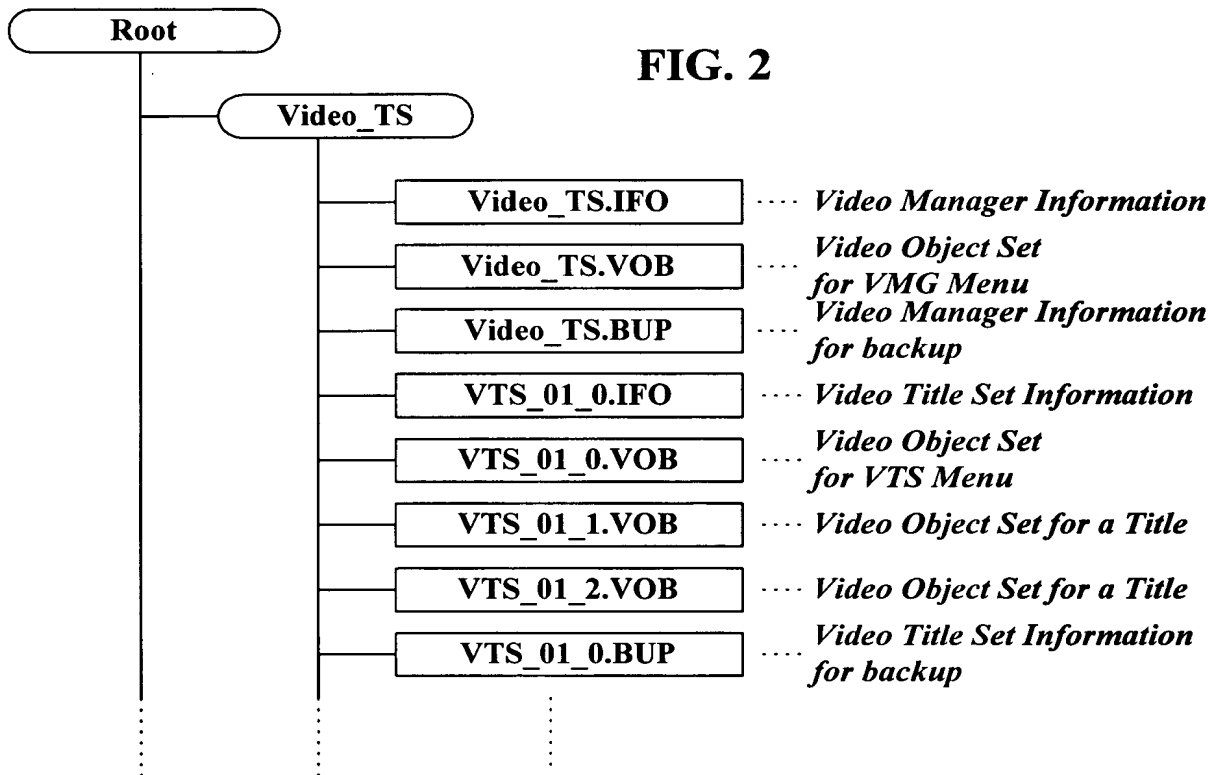


FIG. 3A

File Identifier Descriptor		
RBP	Length	Field Name
0	16	Descriptor Tag
16	2	File Version Number
18	1	File Characteristics
19	1	Length of File Identifier(= L_FI)
20	16	ICB (file entry address)
36	2	Length of Implementation Use(= L_IU)
38	L_IU	Implementation Use
a	L_FI	Name of File Identifier (= N_FI)
b	c	Padding

FIG. 3B

File Characteristics (1Byte)	
0	Existence
1	Directory
2	Deleted
3	Parent
4	Meta-data
5 - 7	Reserved for future Use ('0')

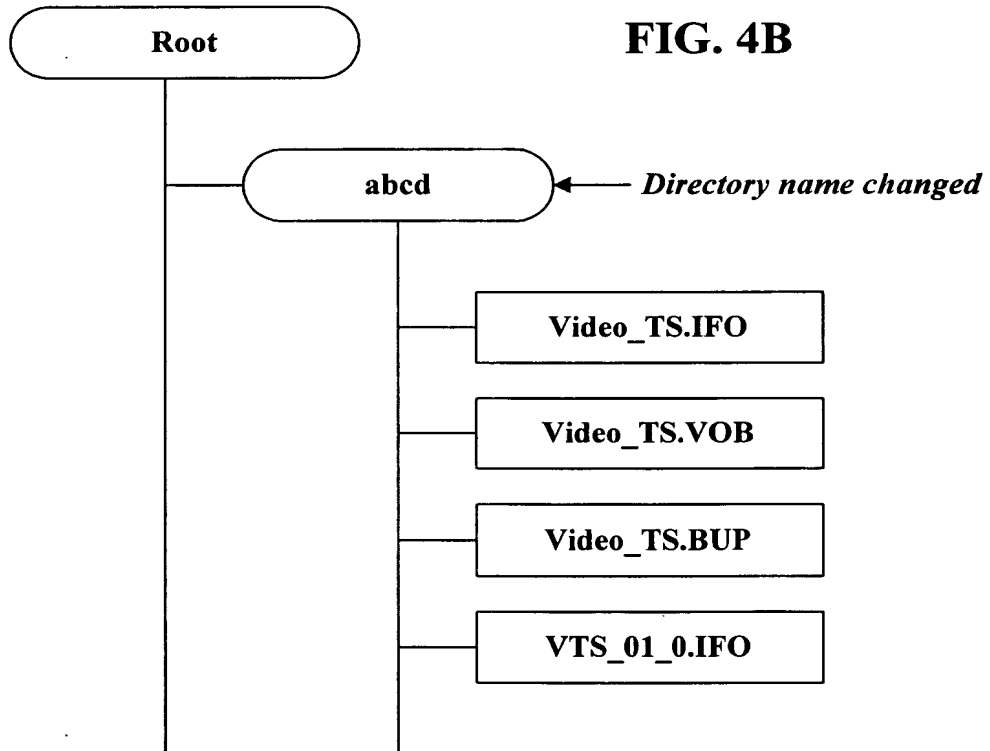
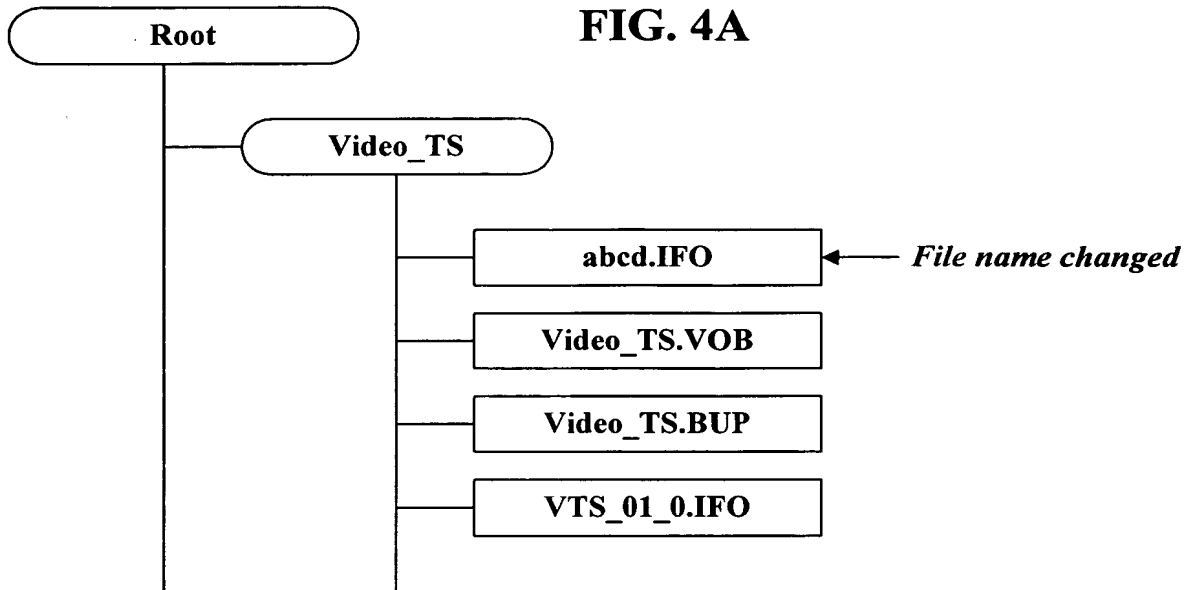


FIG. 4C

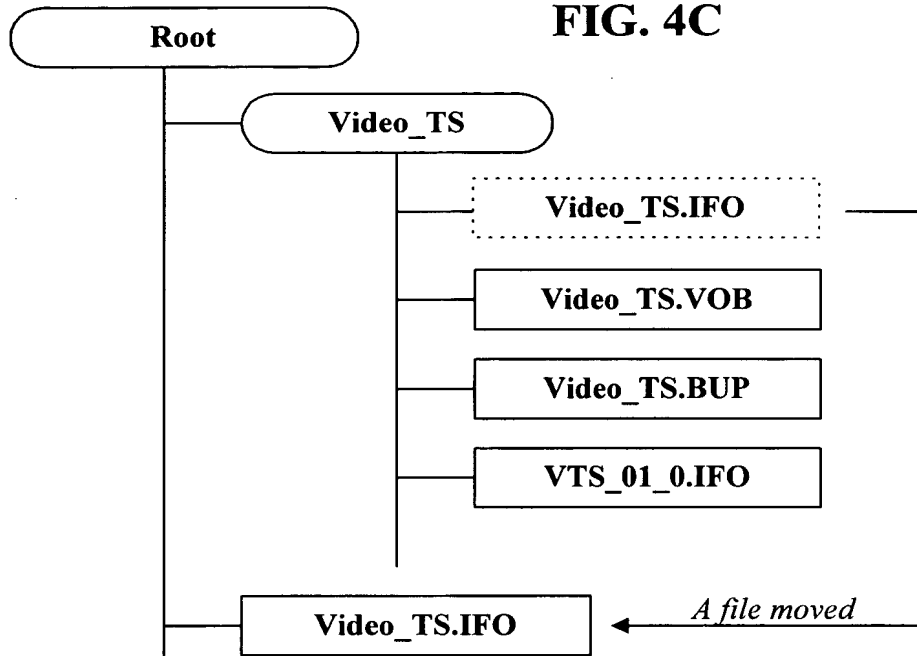


FIG. 4D

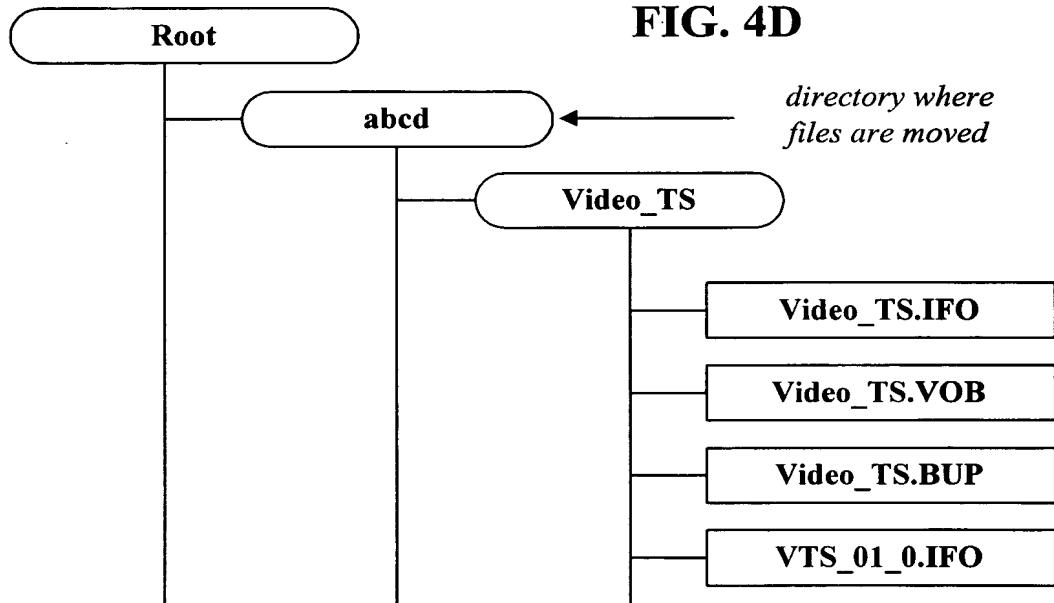


FIG. 5

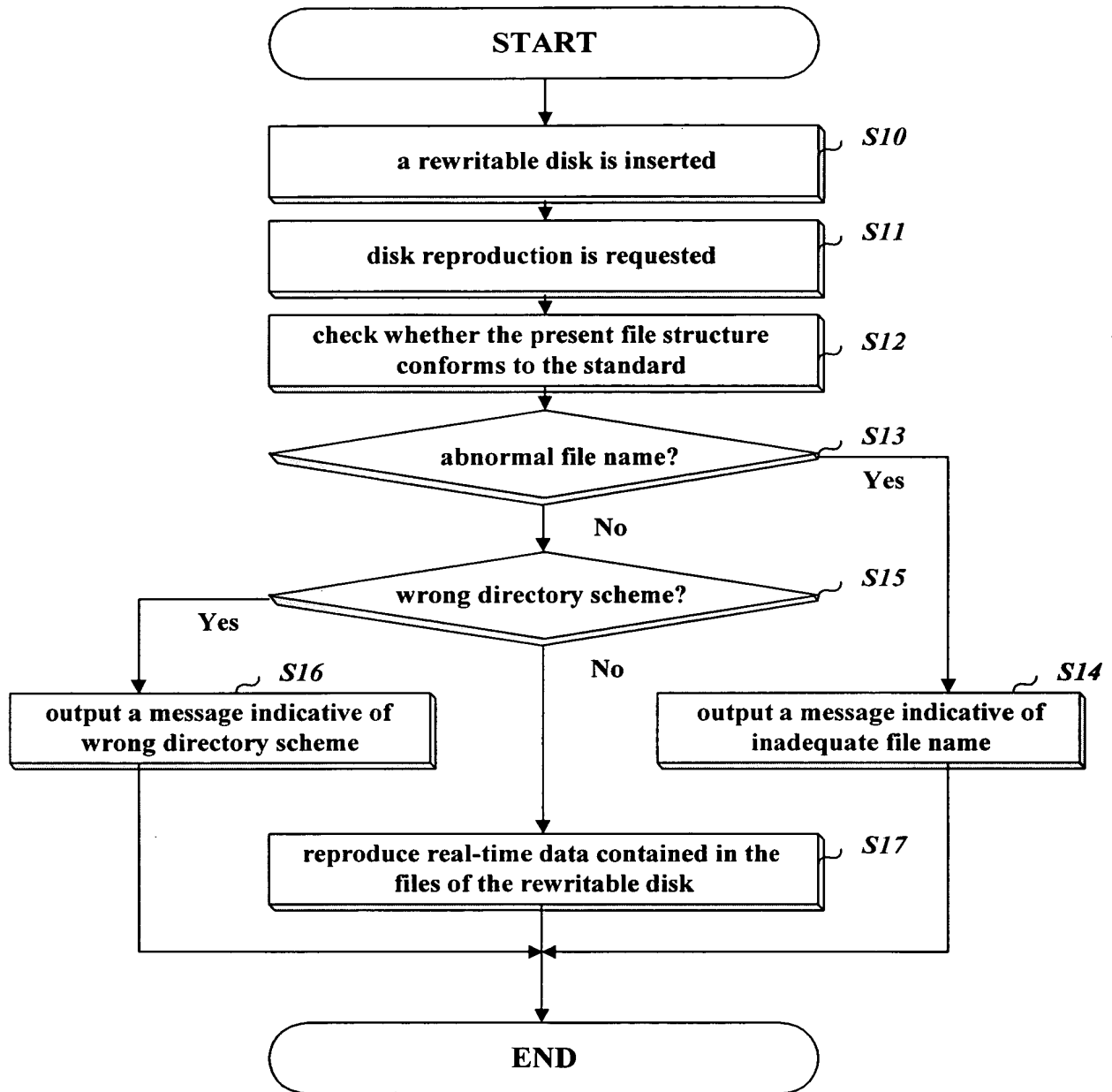


FIG. 6

